

WHAT IS CLAIMED IS:

1. A method of determining a defective pixel in a pixel portion, the pixel portion having a plurality of pixels each comprising a photoelectric conversion element, comprising  
5 the steps of:

reading a first calibration sheet to obtain a first image signal of each of the plurality of pixels by using the photoelectric conversion element;

reading a second calibration sheet to obtain a second image signal of each of the plurality of pixels by using the photoelectric conversion element;

10 calculating a first difference between the first and second image signals of each of the plurality of pixels;

obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of each of the plurality of pixels; and

determining whether each of the plurality of pixels is a defective pixel by  
15 obtaining a second

difference between the first difference of each of the plurality of pixels and the value of selected from a

modal value, an average value and a maximum value of the first difference of the plurality of pixels.

20 2. A method of determining a defective pixel in a pixel portion, the pixel portion having a plurality of pixels each comprising a photoelectric conversion element, comprising the steps of:

reading a first calibration sheet to obtain a first image signal of each of the

plurality of pixels by using the photoelectric conversion element;

reading a second calibration sheet to obtain a second image signal of each of the plurality of pixels by using the photoelectric conversion element;

5 calculating a first ratio between the first and second image signals of each of the plurality of pixels;

obtaining at least a value selected from a modal value, an average value and a maximum value of the first ratio of the plurality of pixels; and

10 determining whether each of the plurality of pixels is a defective pixel by obtaining a second ratio between the first ratio of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first ratio of the plurality of pixels.

3. A method of determining a defective pixel according to claim 1, wherein the first calibration sheet is white and the second calibration sheet is black.

15 4. A method of determining a defective pixel according to claim 2, wherein the first calibration sheet is white and the second calibration sheet is black.

20 5. A method of determining a defective pixel in a pixel portion, the pixel portion having a plurality of pixels each comprising a photoelectric conversion element, comprising the steps of:

obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element;

reading a calibration sheet to obtain a second image signal of each of the plurality

of pixels by using the photoelectric conversion element;

calculating a first difference between the first and second image signals of each of the plurality of pixels;

obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of each of the plurality of pixels; and

determining whether each of the plurality of pixels is a defective pixel by obtaining a second

difference between the first difference of each of the plurality of pixels and the value of selected from a

10 modal value, an average value and a maximum value of the first difference of the plurality of pixels,

wherein the first image signal of each of the plurality of pixels is obtained while  $T > \{C \times V_p / I_d\}$  is satisfied, where  $T$  is an accumulation time,  $C$  is a capacitance of the photoelectric conversion element,  $V_p$  is a voltage applied to the photoelectric conversion element.

6. A method of determining a defective pixel in a pixel portion, the pixel portion having a plurality of pixels each comprising a photoelectric conversion element, comprising the steps of:

20 obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element;

reading a calibration sheet to obtain a second image signal of each of the plurality of pixels by using the photoelectric conversion element;

calculating a first ratio between the first and second image signals of each of the

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15 plurality of pixels;

obtaining at least a value selected from a modal value, an average value and a maximum value of the first ratio of the plurality of pixels; and

5 determining whether each of the plurality of pixels is a defective pixels by obtaining a second ratio between the first ratio of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first ratio of the plurality of pixels,

wherein the first image signal of each of the plurality of pixels is obtained while  $T > \{C \times Vp / Id\}$  is satisfied, where  $T$  is an accumulation time,  $C$  is a capacitance of the 10 photoelectric conversion element,  $Vp$  is a voltage applied to the photoelectric conversion element.

15 7. A method of determining a defective pixel in a pixel portion, the pixel portion having a plurality of pixels each comprising a photoelectric conversion element, comprising the steps of:

obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element;

reading a calibration sheet to obtain a second image signal of each of the plurality of pixels by using the photoelectric conversion element;

20 calculating a first difference between the first and second image signals of each of the plurality of pixels;

obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of the plurality of pixels; and

determining whether each of the plurality of pixels is a defective pixel by

obtaining a second difference between the first difference of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first difference of the plurality of pixels,

wherein the first image signal of each of the plurality of pixels is obtained while an accumulation time of the photoelectric conversion element is 0.

8. A method of determining a defective pixel in a pixel portion, the pixel portion having a plurality of pixels each comprising a photoelectric conversion element, comprising the steps of:

obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element;

reading a calibration sheet to obtain a second image signal of each of the plurality of pixels by using the photoelectric conversion element;

calculating a first ratio between the first and second image signals of each of the plurality of pixels;

obtaining at least a value selected from a modal value, an average value and a maximum value of the first ratio of the plurality of pixels; and

determining whether each of the plurality of pixels is a defective pixel by obtaining a second ratio between the first ratio of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first ratio of the plurality of pixels,

wherein the first image signal of each of the plurality of pixels is obtained while an accumulation time of the photoelectric conversion element is 0.

9. A method of determining a defective pixel in a pixel portion, the pixel portion having a plurality of pixels each comprising a photoelectric conversion element, comprising the steps of:

obtaining a first image signal of each of the plurality of pixels by using the  
5 photoelectric conversion element;

obtaining a second image signal of each of the plurality of pixels by using the  
photoelectric conversion element;

calculating a first difference between the first and second image signals of each of  
the plurality of pixels;

10 obtaining at least a value selected from a modal value, an average value and a  
maximum value of the first difference of the plurality of pixels; and

determining whether each of the plurality of pixels is a defective pixel by  
obtaining a second difference between the first difference of the plurality of pixels and the  
value selected from a modal value, an average value and a maximum value of the first  
15 difference of the plurality of pixels,

wherein the first image signal of each of the plurality of pixels is obtained while  $T$   
 $> \{C \times V_p / I_d\}$  is satisfied, where  $T$  is an accumulation time,  $C$  is a capacitance of the  
photoelectric conversion element,  $V_p$  is a voltage applied to the photoelectric conversion  
element, and

20 wherein the second image signal of each of the plurality of pixels is obtained  
while an accumulation time of the photoelectric conversion element is 0.

10. A method of determining a defective pixel in a pixel portion, the pixel portion having a plurality of pixels each comprising a photoelectric conversion element,

comprising the steps of:

obtaining a first image signal of each of the plurality of pixels by using the photoelectric conversion element;

obtaining a second image signal of each of the plurality of pixels by using the photoelectric conversion element;

calculating a first ratio between the first and second image signals of each of the plurality of pixels;

obtaining at least a value selected from a modal value, an average value and a maximum value of the first ratio of the plurality of pixels; and

determining whether each of the plurality of pixels is a defective pixel by obtaining a second ratio between the first ratio of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first ratio of the plurality of pixels,

wherein the first image signal of each of the plurality of pixels is obtained while  $T > \{C \times V_p / I_d\}$  is satisfied, where  $T$  is an accumulation time,  $C$  is a capacitance of the photoelectric conversion element,  $V_p$  is a voltage applied to the photoelectric conversion element, and

wherein the second image signal of each of the plurality of pixels is obtained while an accumulation time of the photoelectric conversion element is 0.

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11. A device comprising:

a pixel portion having a plurality of pixels each comprising a photoelectric conversion element; and

means for determining a defective pixel,

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wherein the defective pixel is determined comprising the steps of:

reading a first calibration sheet to obtain a first image signal of each of the plurality of pixels by using the photoelectric conversion element;

reading a second calibration sheet to obtain a second image signal of each of the 5 plurality of pixels by using the photoelectric conversion element;

calculating a first difference between the first and second image signals of each of the plurality of pixels;

obtaining at least a value selected from a modal value, an average value and a maximum value of the first difference of each of the plurality of pixels; and

10 determining whether each of the plurality of pixels is the defective pixel by

obtaining a

second difference between the first difference of each of the plurality of pixels and the value 15 of selected

from a modal value, an average value and a maximum value of the first difference of the plurality of pixels.

12. A device comprising:

a pixel portion having a plurality of pixels each comprising a photoelectric conversion element; and

20 means for determining a defective pixel,

wherein the defective pixel is determined comprising the steps of:

reading a first calibration sheet to obtain a first image signal of each of the plurality of pixels by using the photoelectric conversion element;

reading a second calibration sheet to obtain a second image signal of each of the

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plurality of pixels by using the photoelectric conversion element;

15 calculating a first ratio between the first and second image signals of each of the plurality of pixels;

5 obtaining at least a value selected from a modal value, an average value and a maximum value of the first ratio of the plurality of pixels; and

determining whether each of the plurality of pixels is the defective pixel by obtaining a second ratio between the first ratio of the plurality of pixels and the value selected from a modal value, an average value and a maximum value of the first ratio of the plurality of pixels.

10 13. A device according to claim 11, wherein the device is at least a device selected from the group of a hand scanner, a video camera, a digital still camera, a notebook computer, a mobile computer, a cellular phone, a portable game machine and an electronic book.

15 14. A device according to claim 12, wherein the device is at least a device selected from the group of a hand scanner, a video camera, a digital still camera, a notebook computer, a mobile computer, a cellular phone, a portable game machine and an electronic book.